Remarks

Claims 1-15 are pending in the present application. The claims have not been amended.

35 U.S.C. §112, paragraph 2

Claim 1 was rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. The applicants respectfully traverse the Examiner's rejection of claim 1 under 35 U.S.C. §112, second paragraph.

The Examiner argues that the phrase "selected ones of the received packets at a network layer" is unclear because Fig. 4 shows that the packets are received from the DLC-In 230 via line 425, which is at the data link layer. The Examiner further argues that it is unclear what is meant by "other ones of the received packets". Still further, the Examiner argues that it is unclear what the difference is between the "selected ones of the received packets" and the "other ones of the received packets" as claimed, and what is meant by "a first-processed one of the packets" and "subsequently-processed ones of the packets". The Examiner further argues that it is unclear what the relationship is between the "selected ones of the received packets", "other ones of the received packets", "a first processed one of the packets", and "subsequently-processed ones of the packets"[1].

The applicants respectfully assert that each of the claimed limitations are clear and that claim 1 particularly points out and distinctly claims the subject matter of claim 1, thus meeting the threshold requirements of 35 U.S.C. §112, second paragraph, at least for reasons as set out below.

Claim 1 recites, in pertinent part:

> receiving a plurality of packets to be routed to or from a plurality of virtual servers operating in a single physical device;
>
> providing an internal routing table for data link layer routing to or from selected ones of the virtual servers, wherein entries in the internal routing table are learned dynamically while processing selected ones of the received packets at a network layer; and
>
> using the internal routing table for routing other ones of the received packets to or from the selected ones of the virtual servers at the data link layer,
>
> wherein:
>
> the selected ones of the received packets comprise, for each supported pair of input data link layer component and output data link layer component, a first-processed one of the packets which arrives using the input data link layer component and which is addressed to the output data link layer component; and
>
> the other ones of the received packets comprise, for each of the supported pairs of input data link layer component and output data link layer component, subsequently-processed ones of the packets which arrive using the input data link layer component and which are addressed to the output data link layer component.

Thus, as claimed, an internal routing table is provided for data link layer routing to or from selected ones of the virtual servers. Moreover, entries in the internal routing table are learned dynamically while processing "selected ones of the received packets" at a network layer. The "selected ones of the received packets" comprise, for each supported pair of input data link layer component and output data link layer component, "a first-processed one" of the packets which arrives using the input data link layer component and which is addressed to the output data link layer component.

Additionally, as claimed, the internal routing table is used for routing "other ones of the received packets" to or from the selected ones of the virtual servers at the data link layer. The "other ones of the received packets" comprise, for each of the supported pairs of input data link layer component and output data link layer component, "subsequently-processed

[1] See the Office Action dated September 01, 2006, page 2.

ones" of the packets which arrive using the input data link layer component and which are addressed to the output data link layer component.

These claim elements are clear and fully supported by the applicants' specification. By way of illustration and not by way of limitation, in an exemplary data transfer shown and described with reference to Figs. 4-9, a routing table is provided, e.g., in the data link control DLC layer, that is used to route packets from one supported DLC instance to another, i.e., from an input data link layer component and output data link layer component pair (input/output DLC pair), thus bypassing the network layer[2].

In the above exemplary arrangement, entries in the routing table are learned dynamically while processing selected ones of the received packets at a network layer. If a packet for a particular supported input/output DLC pair is not matched to an entry in the routing table (or where fast path routing is not desired for a packet[3]), that packet is selected to be routed up to the network layer. For example, as shown in Fig. 4, the select packets are routed from the DLC-In 230 to the IP layer 470 by the dotted lines 405, 415[4].

Moreover, the first time that a packet for a particular supported input/output DLC pair is forwarded to the network (IP) layer of the stack, e.g., where a first instance of a packet for a particular supported input/output DLC pair could not be matched to an entry in the table and is thus routed up to the IP layer via line 405, the stack creates a new entry in the routing table corresponding to the supported DLC input/output pair. Thus the routing table learns its entries dynamically[5].

Correspondingly, a packet may be routed over one of the supported input/output DLC pairs if, for example, the routing table has an entry mapping the DLC-in on which the packet

[2] See for example, paragraph 0043 of applicants' corresponding U.S. Pat. Pub. No. 2003/0133449.
[3] See for example, paragraph 0053 of applicants' corresponding U.S. Pat. Pub. No. 2003/0133449.
[4] See for example, paragraphs 0042, 0043 of applicants' corresponding U.S. Pat. Pub. No. 2003/0133449.
[5] See for example, paragraphs 0052-0054 of applicants' corresponding U.S. Pat. Pub. No. 2003/0133449.

was received to the DLC-out specified by the packet's destination address[6]. If a match can be made, a DLC routing exit replaces the inbound DLC-specific media header with the appropriate outbound DLC media header and transfers the packet directly to the outbound DLC, thus bypassing the network layer. For example, packets may be routed from the DLC-in 230 to DLC-out 240, thus bypassing the network layer (IP layer 470) as shown in Fig. 4[7].

Accordingly, it can be seen that, in an exemplary disclosed implementation, "selected ones of the received packets" may comprise, for example, a first instance of a packet containing a particular input data link layer component and output data link layer component (input/output DLC pair) that does not have a corresponding entry in the routing table. In this case, that packet is sent to the network layer and a corresponding entry is created in the routing table. Correspondingly, the "other ones of the received packets" may comprise additional instances of that packet having the particular input data link layer component and output data link layer component (input/output DLC pair) because that input/output DLC pair now has a corresponding entry in the routing table.

The applicants note that the literal words used in the claims may take a slightly different form from that used in the specification. However, there is no requirement that the words in the claim must match those used in the specification disclosure[8].

The applicants assert that the terms and phrases used to define the invention in claim 1 provide more than a reasonable degree of clarity and precision as explained more fully herein. In view of the clarifying remarks herein, the applicants respectfully request that the Examiner withdraw the rejection to claim 1 under 35 U.S.C. §112, second paragraph.

[6] See for example, paragraph 0052 of applicants' corresponding U.S. Pat. Pub. No. 2003/0133449.
[7] See for example, paragraph 0043 of applicants' corresponding U.S. Pat. Pub. No. 2003/0133449.

35 U.S.C. §103

Claims 2-15 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Pat. No. 6,049,834 to Khabradar et al. (hereinafter the '834 patent) in view of U.S. Pat. No. 6,948,003 to Newman et al. (hereinafter the '003 patent).

According to the M.P.E.P. §706.02(j), to establish a *prima facie* case of obviousness, the prior art reference must teach or suggest all the claim limitations. It is the applicants' position that the art does not support the rejections to the claims herein, thus a *prima facie* case of obviousness has not been established. Accordingly, the applicants respectfully request that the rejections are withdrawn.

In making the rejection to claim 2, the Examiner is relying on a flow chart (depicted in Fig. 4) and corresponding description in the specification of the '834 patent that describes the processing flow of standard IEEE 802 frames at a typical layer 3 network switch[9]. However, the applicants respectfully disagree with the Examiners interpretation of this processing flow.

For example, contrary to the Examiners interpretations and conclusion on page 4 of the Office action[10], it is the applicants position that the '834 patent does not teach or suggest:

> comparing a destination address of each intercepted packet to entries in a data link layer routing table ...
> forwarding the intercepted packet to a higher layer of the communications protocol stack if the matching entry is not found, for routing by the higher layer; and
> performing data link layer routing of the intercepted packet, without intervention of the higher layer, if the matching entry is found.

At the very first step 56 in the flow described with reference to Fig. 4 of the '834 patent, the layer 3 source and destination addresses are read in addition to the MAC (layer 2)

---

[8] See M.P.E.P. §2173.05(e).
[9] See for example. the '834 patent. Col. 3, starting at line 48.
[10] See Office action mailed Sept. 01, 2006, first and second full paragraphs.

source and destination address[11]. At the second step 57 a decision is made as to whether the layer 2 destination address is that of a router. If the layer 2 destination address is not that of a router (the case where the layer 2 destination address is that of a router is discussed below), a check is made as to whether the source address is known to the switch at step 58. If the source address is not known, it is added to the forwarding table at 60[12].

Next, a check is made to see if the layer 2 destination address known to the switch. There are three possible outcomes in this regard. If the layer 2 destination address is *not known*, i.e., the layer 2 destination address is not in the L2 forwarding table, the frame is simply forwarded to all ports[13]. There is no teaching or suggestion of forwarding this frame up to a higher layer. Rather, the switch treats the frame as if it were a multicast/broadcast layer 2 destination address[14].

If, on the other hand, the layer 2 destination address is known in the forwarding table, the frame is either local to the port and is thus filtered (not forwarded) at step 70, or the frame is forwarded to the appropriate ports at step 72[15].

Thus, if the layer 2 destination address is not that of a router, the switch performs layer 2 routing *regardless* of whether a match is found in the routing table. The routing table is used at this point simply to update its records of source addresses, and to determine which ports (if any) the frame should be routed to. This neither teaches nor suggests that which is claimed. Moreover, this clearly *teaches away from* that which is claimed.

Going back to step 57 in Fig. 4 of the '834 patent, the Examiner argues that if the layer 2 destination address is a router, that designates that a matching entry was not found and the

[11] See for example, the '834 patent, Col. 3, lines 54-55.
[12] See for example, the '834 patent, Col. 3, lines 55-61.
[13] See for example, the '834 patent, Col. 3 line 65 through Col. 4, line 2.
[14] See for example, the '834 patent, Col. 4, lines 1-2.
[15] See for example, the '834 patent, Col. 4, lines 3-10.

packet is forwarded using the L3 shortcut table of the network layer[16]. The applicants respectfully traverse the conclusions drawn by the Examiner from this description. For example, as described in the '834 patent, the L3 shortcut table is used by the layer 2 switch to rewrite the packet source and destination layer 2 addresses[17] so that the router can offload the forwarding tasks to the layer 2 switch[18], i.e., not have to perform layer 3 routing.

That is, the routers that service a particular subnet populate an "L3 shortcut table". However, that shortcut table is used by the layer 2 switch so that if the destination address is known to be a router, the layer 3 shortcut table provides the necessary layer 2 source and destination addresses so that layer 2 forwarding can be achieved by the layer 2 switch without having to send the packet to the network layer and burden the router with forwarding tasks. Accordingly, layer 2 processing is performed in the case of no match to an entry in the routing table. Again, this teaches *away from* that which is claimed.

Still further, it should be noted that at the time that the process checks to see if the destination address is that of a router, the L2 forwarding table has not even been searched. Accordingly, regardless of whether the L3 shortcut table is consulted for layer 2 switch routing across subnets or not, the recognition of a destination address as that of a router fails to teach or suggest as claimed:

> comparing a destination address of each intercepted packet to entries in a data link layer routing table comprising at least one entry, each entry specifying an input data link layer component, output data link layer component pair, to determine if a matching entry is present in the table, the matching entry specifying a data link layer component on which the intercepted packet arrived as the input data link layer component of the pair and the destination address of the intercepted packet as the output data link layer component of the pair;

[16] See the Office action, mailed September 01, 2006, page 4, lines 8-10.
[17] See for example, the '834 patent, Col. 4, lines 13-15.
[18] See for example, the '834 patent, Col. 4, lines 54-58.

Still further, the Examiner recognizes that the '834 patent does not teach or suggest providing a concentrator that combines traffic from a plurality of virtual servers operating in a single physical device into a single outbound stream as claimed.

Accordingly, the Examiner further cites the '003 patent. The invention in the '003 patent provides Internet services by assigning each customer one or more private virtual servers. Customers exchange private address transmissions with a service provider using tunnels to traverse the local or regional network connecting the customer with a service provider[19]. The service provider receives transmissions at a gateway into the service provider's data center. The service provider routes the transmission to the private virtual server belonging to the customer that sent the transmission. The service provider also routes privately addressed transmissions back to individual customers using tunnels. In this way, the service provider is able to implement separate routing contexts on behalf of each customer[20].

As shown in figure 4 of the '003 patent, a physical host computer includes a plurality of virtual servers. Each private virtual server includes an associated IP stack 422. An IP stack manages the transfer of information in packets according to Internet protocols[21]. Figure 5 of the '003 patent illustrates a multiplexing de-multiplexing mechanism containing a lookup table that consists of a list of IP stacks in the physical host computer and their associated outgoing tunnel in identifiers[22].

Notably, all interaction is described as being performed at the Internet protocol layer (layer 3). There are no transactions performed at the DLC layer, nor is there a teaching, suggestion or motivation to provide layer 2 processing. The Examiner has provided no teaching or suggestion in the prior art, that would suggest why one would combine a layer 3 switch, which is intended for data transfers in a network between and among subnets, with a

[19] See for example, the '003 patent, Col. 4, lines 12-15.
[20] See for example, the '003 patent, Col. 4, lines 18 -23.
[21] See for example, the '003 patent, Col. 9, lines 27-50.
[22] See for example, the '003 patent, Col. 10 lines 5-10.

intranet service provider of the '003 patent other than by suggesting Examiner-created subjective motivation to combine the references. Regardless, even when combined, which the applicants contend are not combinable for purposes relevant to the claims of this application, the references fail to teach or suggest each limitation.

Accordingly, the applicants respectfully request that the Examiner withdraw the rejection of claim 2 and the claims that depend therefrom under 35 U.S.C. §103(a).

Further, claims 8 and 12 recite similar limitations as claim 2, and thus the arguments set out more fully herein with regard to claim 2 apply to claims 8 and 12 by analogy. Accordingly, the applicants respectfully request that the Examiner withdraw the rejection of claims 8, 12 and the claims that depend therefrom under 35 U.S.C. §103(a).

Conclusion

For all of the above reasons, the applicants respectfully submit that the above claims recite allowable subject matter. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully solicited.

Respectfully submitted,
Stevens & Showalter, L.L.P.
By

Thomas E. Lees 46,867

7019 Corporate Way
Dayton, Ohio 45459-4238
Phone 937-438-6848
Fax 937-438-2124